AUTOSAR – ECU Software Architecture

AUTOSAR RTE:
by specifying interfaces and their communication mechanisms, the applications are decoupled from the underlying HW and Basic SW, enabling the realization of Standard Library Functions.

AUTOSAR Software Architecture (AUTOSAR):
- Standardized, openly disclosed interfaces
- HW independent SW layer
- Transferability of functions
- Redundancy activation
AUTOSAR - First Experiences.
Model based development under AUTOSAR.

This takes place at Application level – not the basic software.
AUTOSAR - First Experiences.
A subset of the Virtual Function Bus.
AUTOSAR - First Experiences.
„Proof of Concept“ (June 2004).

Display
MMI: WaferBoard
QNX / JAVA

RTE (JAVA/QNX)
Basic SW

Mirror GUI

RTE (C/SC)
Basic SW

MPC 565 OSEK SC /C

Rear mirror left
LIN

Rear mirror right

Mirror Control
Mirror Park

CAN
Simulation

EC E60
AUTOSAR - First Experiences.
Architecture of the BMW SC/RTE.

Runtime Environment (RTE)

AUTOSAR Software Component
AUTOSAR Interface
Application Software Component
AUTOSAR Interface
Actuator Software Component
AUTOSAR Interface
Sensor Software Component
AUTOSAR Interface

Application
Actuator
Sensor

Basic Software
Propr. Interface

AUTOSAR conform API

OSK OS

Propr. Interface
Error Manager

Propr. Interface
Diagnose (KWP 2000)

Propr. Interface
OSEK NM

Propr. Interface

BMW Message Manager

Propr. Interface

ECU-Hardware

CAN Communication Layer

Proprietary Interface

Proprietary API

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AUTOSAR – Migration Strategy.
A stable subset of the VFB for migration.
AUTOSAR – Migration Strategy.
Migration at SW-component level.

RTE based SW Components are migratable with an calculable amount of adaption.

An application, coded against the RTE interface, can be migrated up to the fully compliant AUTOSAR standard core.

„Stepwise Migration of Software Level“
AUTOSAR – Migration Strategy. 
RTE against an existing COM Matrix.

AUTOSAR Vision: 
From the partitioning to the COM matrix.

Status Quo: 
From the COM Matrix to the ECU interface

Ergo: „AUTOSAR brings up a new requirement for migration: generating an RTE against an existing COM matrix“

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AUTOSAR – Migration Strategy.
Migration into an existing board network.

Bus Mapping
- Integration of an RTE based ECU into an existing system.
- No ADUs > 8 Byte
The RTE based ECU behaves towards the bus exactly like a "classical" ECU.

"stepwise migration of ECU level"
AUTOSAR – Migration Strategy.

ORPHEUS = modeling tools + code generator

- Enabler for migration
  Integrated in BMW SC6, Import DBC/FIBEX

- Graphical Modeling of
  - AUTOSAR Application Components
  - Mapping to CAN and Flexray Bus
  - Scheduling
  - Partitioning of Software

- Optimized Codegeneration of RTE
  (incl. autom. Unit Tests)

- Open
  (Adation to ASCET, AUTOSAR Templates)